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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/092,407	03/06/2002	Sumio Morioka	JP920010023US1	9936

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SUITE 503
FOREST HILLS, NY 11375

EXAMINER	
TABONE JR, JOHN J	

ART UNIT	PAPER NUMBER
2133	

DATE MAILED: 04/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/092,407	MORIOKA ET AL.	
	Examiner	Art Unit	
	John J. Tabone, Jr.	2133	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 March 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

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FINAL DETAILED ACTION

1. Claims 1-16 have been examined. Clams 1 and 9 have been amended.

2. The rejection under 35 USC 101 for claims 1-4 is withdrawn by the Examiner as a result of Applicant's amendment of 01/06/2005. However, claim 9 has not been amended in such a way as to overcome the 35 USC 101 rejection. The claim still pertains to software that executes a utility which can just as well be calculated by hand. Therefore, claims 9-12 stand rejected.

Response to Arguments

Applicant's arguments filed 01/06/2005 have been fully considered but they are not persuasive.

<u>As per arguments for claims 1, 5, 9 and 13:</u>

Applicant's states "... none of the documents presented in the Office Action teach or suggest employing Jacobi's formula, (refer to claim for equation), to enable the calculationof the solution, (refer to claim for equation), as recited in claims 1, 5, 9 and 13". The Examiner asserts that the previous Office Action of Record clearly discloses in Zhang that the Levinson algorithm, Berlekamp-Massey algorithm and <u>Euclidean algorithm</u> are the three well-known fast algorithms for the purpose of solving Yule-Walker equations. Applicant's own specification also cites the use of these algorithms for solving Yule-Walker equations on page 45 which calculates the determinants of the

symmetric matrices, or as disclosed by Koga, symmetrical determinant. The previous Office Action of Record states "It would have been obvious to one of ordinary skill in the art at the time the invention was made that Koga's symmetrical determinant calculation would be implemented using Jacobi's formula. The artisan would have been motivated to do so because the Jacobi's formula is a method well known in the art for the calculation of the determinants of the symmetric matrices". In support for these statements the following teaching references will be cited. Gotze, "Parallel Methods for Iterative Matrix Decompostions", 1991, IEEE teaches Jacobi methods for the symmetric eigenvalue problem work by performing a sequence of the orthogonal similarity transformations of the symmetric matrix (see equation 1). Gotze's paper mainly deals with the Jacobi method for the symmetric eigenvalue problem, but the present ideas can also be applied to other iterative matrix decomposition algorithms using orthogonal rotation. (Pg. 232, col. 2, Abstract). Paul et al., "Error Analysis of CORDIC-Based Jacobi Alogrithms", 1995, IEEE teaches The Jacobi algorithm for eigenvalue calculation of symmetric matrices can be performed with a CORDIC algorithm as its basic module. Paul et al. also teaches the Jacobi algorithm (JA) is well suited for eigenvalue calculation on microprocessor arrays. Paul et al. further teaches the CORDIC-Based Jacobi algorithm (CJA) calculates and performs the rotations by the CORDIC algorithm in order to simplfy the VLSI realization. Paul et al. discloses Jacobi's algorithm computes the eigenvalue decompositions of a symmetric n x n matrix (see equation) by applying a sequence of two-sided orthogonal rotations to the matrix A. (Pg. 947, col. 1, section I. & II., Abstract). Hsiao, "Adaptive Jacobi Method for Parallel Singular Value

Decompositions", 1995, IEEE teaches Jacobi method has been used on special-purpose multiprocessor VLSI systems for parallel singular value decomposition (SVD) on dense matrices, and CORDIC processors are often used as the basic processing elements to implement the two-sided rotations, the fundamental operations in the Jacobi method. (Pg. 3203, Abstract). The Examiner asserts that if one skilled in the art had the need to calculate the determinants of the symmetric matrices as disclosed in claims 1, 5, 9 and 13 the Jacobi's formula would be obvious to one of ordinary skill in the art at the time the invention was made as a way to perform such a calculation. The Examiner has presented substantial evidence to confirm such a statement.

It is the Examiner's conclusion that independent claims 1, 5, 9 and 13 are not patentably distinct or non-obvious over the prior arts of record namely, Ohira et al. (US-20010053225) in view of Zhang et al. (On the Methods for Solving Yule-Walker Equations and further in view of Koga (US-4694455). Therefore, the rejection is maintained. Based on their dependency on claims 1, 5, 9 and 13, claims 2-4, 6-8, 10-12 and 14-16, respectively, stand rejected.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 9-12 are rejected according 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As per claims 9-12:

These claims pertain to a program per se and are non-statutory since said program is not embodied in a tangible computer-readable medium. Also, these claims pertain to a mathematical algorithm and manipulation of an abstract idea with no application of the mathematical algorithm to the technological art. These claims further do not produce a useful concrete and tangible result. See State Street 149 F.3d 1373.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohira et al. (US- 20010053225), hereinafter Ohira, in view of Zhang et al. (On the Methods for Solving Yule-Walker Equations), hereinafter Zhang, and further in view of Koga (US-4694455), hereinafter Koga.

Claims 1, 5, 9 and 13:

Ohira discloses an invention which relates to a method for encoding/decoding an error correcting code, a transmitting apparatus and a network which are suitable for use in optical communication networks. Ohira teaches an encoding side (encoding unit) which receives a client signal from a transmission path on a client side, error-correction-encodes the client signal, and then transmits the resulting signal to a super line side as a super FEC signal. (Page 1, ¶ 1, page 3, ¶ 48). Ohira also teaches decoding side which receives and decodes a super forward error correction (FEC) (encoded signal) signal and then transmits the decoded signal to a communication path on the client side as a client signal. Ohira suggests an "output unit" by outputting the restored client signal that is converted into an optical signal to the transmission path on the client side. Ohira further for calculations intended to find an error locator polynomial (hereinafter abbreviated as "ELP") indicative of an error position and each polynomial coefficient of an error evaluator polynomial (hereinafter abbreviated as "EVP") indirectly indicative of an error value from the result of the syndrome calculation, a method using Euclidean mutual division (Yule-Walker equation) is widely known. Ohira even further teaches the error position calculation is performed by substituting an element of Galois field corresponding to a symbol position for an RS code and to a bit position for a BCH code into an error locator polynomial (ELP) to determine whether or not an error exists at the symbol position or the bit position by examining whether or not the substitution results in "zero". Likewise, for the error value calculation, an element of Galois field corresponding to a symbol position or a bit position is substituted into an error evaluator polynomial

(EVP) or an ELP differential polynomial, and if an error is found at the symbol position or the bit position, the error value is calculated (determining the number of errors to be the maximum matrix size that corresponds to said obtained solution that is not zero, and determining whether said number of errors equals the maximum number of correctable errors). (Page 17, ¶ 278). Ohira does not explicitly teach establishing a Yule-Walker equation or obtaining the solution thereof, however, Ohira does disclose while describing the decoding side that the primitive element of Galois field (2^n), which is the basis for the Reed-Solomon code and BCH code, and <u>a method of using Euclidean mutual division</u> (Yule-Walker equation). (Page 7, ¶ 109, page 17, ¶ 278). Zhang teaches, in an analogous art disclosing methods of speeding up the solution of Yule-Walker equations, the key equation for decoding BCH and Reed-Solomon code and the equation involved in the identification of the coefficients of an autoregressive model, are Yule-Walker equations. Zhang also teaches the Levinson algorithm, Berlekamp-Massey algorithm and <u>Euclidean algorithm</u> are the three well-known fast algorithms for this purpose. It would have been obvious to one of ordinary skill in the art at the time the invention was made that Ohira does suggest establishing a Yule-Walker equation or obtaining the solution thereof. The artisan would have been motivated to do so because Ohira utilizes the <u>Euclidean algorithm</u> disclosed by Zhang (Page 2987, col. 1, page 2991, col. 2). Ohira does not explicitly teach "employing Jacobi's formula to result in the calculation of the determinants of the symmetric matrices. However, Koga teaches, in an analogous art pertaining to an error correction code decoding system using BCH (Bose-Chaudhuri-Hocquenghem) code for correcting error bits, a Q determinant or a Q

polynomial that gives the value of a coefficient of an error locator polynomial is calculated one by one, using those already calculated, and the A determinants or Q polynomials thus obtained determine the number of error bits, and all the coefficients of the error locator polynomial. (Col. 2, lines 4-11). Koga also teaches since a Q determinant is a symmetrical determinant, any element of which is a syndrome belonging to GF (2^m), and since a diagonal element of it denoted by S_{2i} can be expressed as $S_{2i} = S_i^2$, it is always given as the square of a polynomial of syndromes. (Col. 4, lines 52-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made that Koga's symmetrical determinant calculation would be implemented using Jacobi's formula. The artisan would have been motivated to do so because the Jacobi's formula is a method well known in the art for the calculation of the determinants of the symmetric matrices. It also, would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Ohira's decoder to incorporate the symmetrical determinant calculation ability of Koga. The artisan would have been motivated to do so because this would enable Ohira's decoder to perform the calculation of the determinants of the symmetric matrices of Koga for proper error location and determining the number of error bits.

<u>Claims 2, 6, 10 and 14:</u>

Ohira teaches, while describing the encoding/decoding side, that the primitive element of Galois field (2^n), which is the basis for the Reed-Solomon code and BCH code. (Page 4, ¶ 64, Page 7, ¶ 109).

Claims 3, 7, 11 and 15:

"said received digital signals are transmitted using wavelength division multiplexing."

Ohira teaches it is possible to readily encode an error correcting code which is suitable for maintaining a transmission distance when the degree of multiplexing is increased in the time division multiplexing, maximizing the transmission distance for a mixture of optical signals at different bit rates in the wavelength division multiplexing, and increasing a regenerator interval on condition that the degree of multiplexing is not changed in the time division multiplexing. (Page 7, ¶ 112).

Claims 4, 8, 12 and 16:

"used for at least one of the decoding of digital signals and error correction."

Ohira teaches when code subblocks 10-i for the C1–encoding comprise 16 subblocks each having a length of 255 bytes corresponding to each of 16 rows, either of the following two can be employed as the C1 code: an eight-error-correcting RS code (255, 239); and an eleven-error-correcting shortened BCH code (2040, 1919) based on Galois field (2048). (Page 7, ¶ 116, Page 8, ¶ 117,118).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John J. Tabone, Jr. whose telephone number is (571) 272-3827. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Albert DeCady can be reached on (571) 272-3819. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

John J. Tabone, Jr.
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4/7/05

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